Amendments to the Claims

1 (CURRENTLY AMENDED): A three-dimensional data processing method comprising:

~~a first step in which first data showing~~ acquiring three-dimensional image data of taken images of a real existing object and three-dimensional shape data of taken images of the real existing object ~~is acquired~~; [[and]]

generating a polygon mesh based on the three-dimensional shape data of taken images of the real existing object;

estimating surface reflectance properties of the real existing object based on the three-dimensional image data obtained at the acquiring step and the polygon mesh generated at the generating step thereby generating a bump map; and

reproducing image of the real existing object with a computer graphic based on the polygon mesh generated at the generating step and the bump map generated at the estimating step

~~a second step in which a bump map for creating a three-dimensional image of the object is generated based on the first data,~~

~~wherein in the second step, by estimating surface reflectance properties of the object based on the first data, the bump map as a component of surface reflectance properties data showing the surface reflectance properties is generated~~.

2-10 (CANCELED):

11 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 1, wherein the surface reflectance properties [[data]] includes data on constants in a reflection model function and data on normal directions constituting the bump map.

12 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 1, wherein the surface reflectance properties [[data]] is data specifying a specific reflectance from a reflectance table which shows a series of reflectances corresponding to light source directions and image-taking directions in tangential coordinate systems, and includes data on normal directions forming the bump map.

13 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 1, further comprising:

~~a third step in which a~~ acquiring the polygon mesh ~~showing~~ that shows a simplified shape of the surface shape of the object ~~is acquired~~,

wherein in the ~~second~~ estimating step, the surface reflectance properties of the object are estimated by using the polygon mesh acquired in the ~~third~~ acquiring the polygon mesh step and data showing parameters of image-taking of the object.

14 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 1, wherein in the ~~second~~ estimating step, the bump map is generated so that an area of each texel on the bump map becomes substantially equivalent to an area where one pixel of the image data occupies on a surface of the object.

15 (ORIGINAL): The three-dimensional data processing method according to claim 13, wherein the bump map shows amounts of positional changes of respective texels on a texture map to be pasted on the polygon mesh with respect to the polygon mesh.

16 (ORIGINAL): The three-dimensional data processing method according to claim 13, wherein the bump map shows normal directions of respective texels on a texture map to be pasted on the polygon mesh.

17 (ORIGINAL): The three-dimensional data processing method according to claim 13, wherein the bump map shows differences between normal directions of respective texels on a texture map to be pasted on the polygon mesh and normal directions of the polygon mesh.

18 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 13, wherein in the ~~third~~ acquiring the polygon mesh step, the polygon mesh is generated based on the image data.

19 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 13, wherein in the ~~third~~ acquiring the polygon mesh step, an input of data for the polygon mesh is received.

20 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 13, wherein in the ~~third~~ acquiring the polygon mesh step, a polygon mesh having one of a vertex number according to information on a specified vertex number and polygon number according to information on a specified polygon number is generated.

21 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 13, wherein in the ~~third~~ acquiring the polygon mesh step, bump texture coordinates which specify a pasting position of the bump map are provided for the respective vertices of the polygon mesh.

22 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 1, wherein in the ~~second~~ estimating step, the bump map having a texel number according to information on a specified resolution of the bump map is generated.

23 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 1, wherein in the ~~second~~ estimating step, the bump map is generated so as to have a normal distribution satisfying a condition that a rotation of vector value of each texel becomes zero.

24 (CURRENTLY AMENDED): The three-dimensional data processing method according to claim 1, further comprising:

an image generating step in which a three-dimensional image of the object is generated by using the bump map generated in the ~~second~~ estimating step, and

an image output step in which the generated three-dimensional image is output.

25 (CURRENTLY AMENDED): A three-dimensional data processing program embodied on a computer-readable medium, the program comprising steps of:

~~a first step in which first data showing~~ acquiring three-dimensional image data and three-dimensional shape data of taken images of a real existing object; ~~is acquired, and~~

generating a polygon mesh based on the three-dimensional shape data of taken images of the real existing object;

estimating surface reflectance properties of the real existing object based on the three-dimensional image data obtained at the acquiring step and the polygon mesh generated at the generating step thereby generating a bump map; and

reproducing image of the real existing object with a computer graphic based on the polygon mesh generated at the generating step and the bump map generated at the estimating step

~~a second step in which a bump map for creating a three-dimensional image of the object is generated based on the first data,~~

~~wherein in the second step, by estimating surface reflectance properties of the object based on the first data, the bump map as a component of surface reflectance properties data showing the surface reflectance properties is generated~~.

26-34 (CANCELED):

35 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 25, wherein the surface reflectance properties [[data]] includes data on constants in a reflection model function and data on normal direction constituting the bump map.

36 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 25, wherein the surface reflectance properties [[data]] is data specifying a specific reflectance from a reflectance table which shows a series of reflectances corresponding to light source directions and image-taking directions in tangential coordinate systems, and includes data on normal directions constituting the bump map.

37 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 25, further comprising:

~~a third step in which a~~ acquiring the polygon mesh ~~showing~~ that shows a simplified shape of the surface shape of the object ~~is acquired~~,

wherein in the ~~second~~ estimating step, surface reflectance properties of the object are estimated by using the polygon mesh acquired in the ~~third~~ acquiring the polygon mesh step and parameters of image-taking of the object.

38 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 25, wherein in the ~~second~~ estimating step, the bump map is generated so that an area of each texel on the bump map becomes substantially equivalent to an area where one pixel of the image data occupies on a surface of the object.

39 (ORIGINAL): The three-dimensional data processing program according to claim 37, wherein the bump map shows amounts of positional changes of respective texels on a texture map to be pasted on the polygon mesh with respect to the polygon mesh.

40 (ORIGINAL): The three-dimensional data processing program according to claim 37, wherein the bump map shows normal directions of respective texels on a texture map to be pasted on the polygon mesh.

41 (ORIGINAL): The three-dimensional data processing program according to claim 37, wherein the bump map shows differences between normal directions of respective texels on a texture map to be pasted on the polygon mesh and normal directions of the polygon mesh.

42 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 37, wherein in the ~~third~~ acquiring the polygon mesh step, the polygon mesh is generated based on the image data.

43 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 37, wherein in the ~~third~~ acquiring the polygon mesh step, an input of data for the polygon mesh is received.

44 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 37, wherein in the ~~third~~ acquiring the polygon mesh step, a polygon mesh having one of a vertex number according to information on a specified vertex and polygon number according to information on a specified polygon number is generated.

45 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 37, wherein in the ~~third~~ acquiring the polygon mesh step, bump texture coordinates which specify a pasting position of the bump map are provided for the respective vertices of the polygon mesh.

46 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 25, wherein in the ~~second~~ estimating step, the bump map having a texel number according to information on a specified resolution of the bump map resolution is generated.

47 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 25, wherein in the ~~second~~ estimating step, the bump map is generated so as to have a normal distribution satisfying a condition that a rotation of vector value of each texel becomes zero.

48 (CURRENTLY AMENDED): The three-dimensional data processing program according to claim 25, further comprising:

an image generating step in which a three-dimensional image of the object is generated by using the bump map generated in the ~~second~~ estimating step, and

an image output step in which the generated three-dimensional image is output.

49 (ORIGINAL): A three-dimensional data processing system comprising:

a computer which executes a three-dimensional data processing program according to claim 25.

50 (CURRENTLY AMENDED): A three-dimensional data processing system comprising:

a ~~shape~~ data acquiring section which acquires ~~first data that shows~~ three-dimensional image data and three-dimensional shape data of taken images of a real existing object; and

a ~~bump map~~ generating section which generates which generates a polygon mesh based on the three-dimensional shape data of taken images of the real existing object; ~~a bump map for creating a three-dimensional image of the object based on the first data,~~

an estimating section which estimates surface reflectance properties of the real existing object based on the three-dimensional image data obtained at the acquiring section and the polygon mesh generated at the generating section thereby generating a bump map; and

a reproducing section which reproduces image of the real existing object with a computer graphic based on the polygon mesh generated at the generating section and the bump map generated at the estimating section

~~wherein the bump map generating section generates the bump map as a component of surface reflectance properties data showing surface reflectance properties of the object by estimating the surface reflectance properties based on the first data~~.

51-59 (CANCELED):

60 (CURRENTLY AMENDED): The three-dimensional data processing system according to claim 50, wherein the surface reflectance properties [[data]] includes data on constants in a reflection model function and data on normal directions constituting the bump map.

61 (CURRENTLY AMENDED): The three-dimensional data processing system according to claim 50, wherein the surface reflectance properties [[data]] is data specifying a specific reflectance from a reflectance table which shows a series of reflectances corresponding to light source directions and image-taking directions in tangential coordinate systems, and includes data on normal directions constituting the bump map.

62 (CURRENTLY AMENDED): The three-dimensional data processing system according to claim 50,

wherein ~~a polygon mesh acquiring~~ the generating section ~~which acquires a~~ generates the polygon mesh ~~showing~~ that shows a simplified shape of the surface shape of the object, and

the ~~bump map generating~~ estimating section estimates the surface reflectance properties of the object by using [[a]] the polygon mesh ~~acquired by the polygon mesh acquiring~~ generated by the generating section and data showing parameters of image-taking of the object.

63 (CURRENTLY AMENDED): The three-dimensional data processing system according to claim 50, wherein the ~~bump map generating~~ estimating section generates the bump map so that an area of each texel on the bump map becomes substantially equivalent to an area where one pixel of the image data occupies on a surface of the object.

64 (CURRENTLY AMENDED): The three-dimensional data processing system according to clam 50, wherein the ~~bump map generating~~ estimating section generates the bump map having a texel number according to information on a specified resolution of the bump map.

65 (CURRENTLY AMENDED): The three-dimensional data processing system according to clam 50, wherein the ~~bump map generating~~ estimating section generates the bump map so as to have a normal distribution satisfying a condition that a rotation of vector value of each texel becomes zero.

66 (CURRENTLY AMENDED): The three-dimensional data processing system according to clam 50, further comprising:

an image generating section which generates a three-dimensional image of the object by using the bump map generated by the ~~bump map generating~~ estimating section, and

an image output section which outputs the generated three-dimensional image.